

RESEARCH DEPARTMENT

**TRANSMITTING AERIALS FOR THE WEARDALE V.H.F. TELEVISION AND
V.H.F. SOUND STATION**

Research Report No. E-117/4
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INTRODUCTION

The Weardale relay station came into operation on 21st February 1966. It provides a television and v.h.f. sound service to Wolsingham, Frosterley, Stanhope, Westgate, Eastgate and other small communities in the area.

SUMMARY OF INSTALLATION

<u>Site:</u>	The site is at Intake Farm approximately 2.41 km south-east of Stanhope, grid reference NZ 025385, height 396 m a.m.s.l.		
<u>Support Structure:</u>	The support structure consists of a 36.6 m (120 ft) square section self-supporting tower oriented with one side on bearing 226° ETN. The tower is screened on all faces by horizontal 25.4 mm (1 in.) diameter rods at 229 mm (9 in.) vertical separation between the levels 18.9 m (62 ft) and 22.3 m (73 ft) a.g.l.		
<u>General Arrangement:</u>	See Fig. 1.		
<u>Band I</u>			
Channel:	Channel 1, with horizontal polarization is used. The vision carrier is offset +10.125 kHz and the sound carrier -3.125 kHz.		
Aerial:	The aerial ¹ consists of four tiers each of a horizontal $\lambda/2$ dipole plus a $\lambda/4$ spaced parasitic reflector. The dipole/reflector units in tiers 1 and 3 are oriented to give maximum radiation on a bearing of 226° ETN and those in tiers 2 and 4 on a bearing of 316° ETN. The tiers are numbered from the top. The dipoles are fed with equal co-phased currents. The inter-tier spacing is 0.5λ and the mean aerial height 30.6 m (100 ft 3 in.) a.g.l. There are independent main feeders to each two tier half aerial.		
Power:	A single 100 watt translator amplifier under-run at 80 watts output is used.		
Templet and horizontal radiation pattern (h.r.p.):	See Fig. 2 and Note.		
Gain:	Mean intrinsic gain		1.1 dB
	<u>Deduct:</u> losses due to distribution feeder and possible misalignment		<u>0.2 dB</u>
	Mean net gain		0.9 dB
	<u>Deduct:</u> loss in main feeder, type RPC 2603	1.2 dB	
	network loss	<u>0.6 dB</u>	<u>1.8 dB</u>
	Mean effective gain		<u>-0.9 dB</u>

Band II

Carrier Frequencies:	89.7 (Light), 91.9 (Third) and 94.1 (Home) MHz.		
Aerial:	The aerial ¹ consists of a single horizontal $\lambda/2$ dipole oriented on a bearing of 281° ETN, spaced 1.77 m (5 ft 10 in.) from the tower axis. The aerial height is 20.6 m (67 ft 6 in.) a.g.l.		
Power:	A single 100 watt translator amplifier is used for each programme.		
Templet and h.r.p.:	See Fig. 3 and Note 2.		
Gain:	Mean intrinsic and net gain		-2.6 dB
	<u>Deduct:</u> loss in main feeder, type RPC 2603		1.2 dB
	network loss		0.9 dB 2.1 dB
	Mean effective gain		<u>-4.7 dB</u>

Programme Source: Both television and sound programmes are obtained by direct pick-up of the transmissions from Pontop Pike.

- Notes:
1. The preliminary aerial design was based on a theoretical prediction of the h.r.p., the effect of re-radiation from support structures and mutual coupling between tiers being neglected. Small-scale model measurements were made to obtain an accurate h.r.p. This is shown in Fig. 2.
 2. The aerial design was based on the theoretical h.r.p. using an equivalent cylinder for the tower. An accurate h.r.p. was obtained from small-scale model measurements and is shown in Fig. 3.

REFERENCE

1. Detailed information on the construction and dimensions of the aerial is given in the following drawings held by BBC Transmitter Planning and Installation Department.

P.I.D. 9114.2.1A	General arrangement of aeriels
P.I.D. 8732.2.6AO	Band I Transmitting Dipole and Reflector
P.I.D. 8732.2.3J	Band II Transmitting Dipole
P.I.D. 8732.2.4H	Band I Receiving Yagi
P.I.D. 8732.2.5H	Band II Receiving Yagi

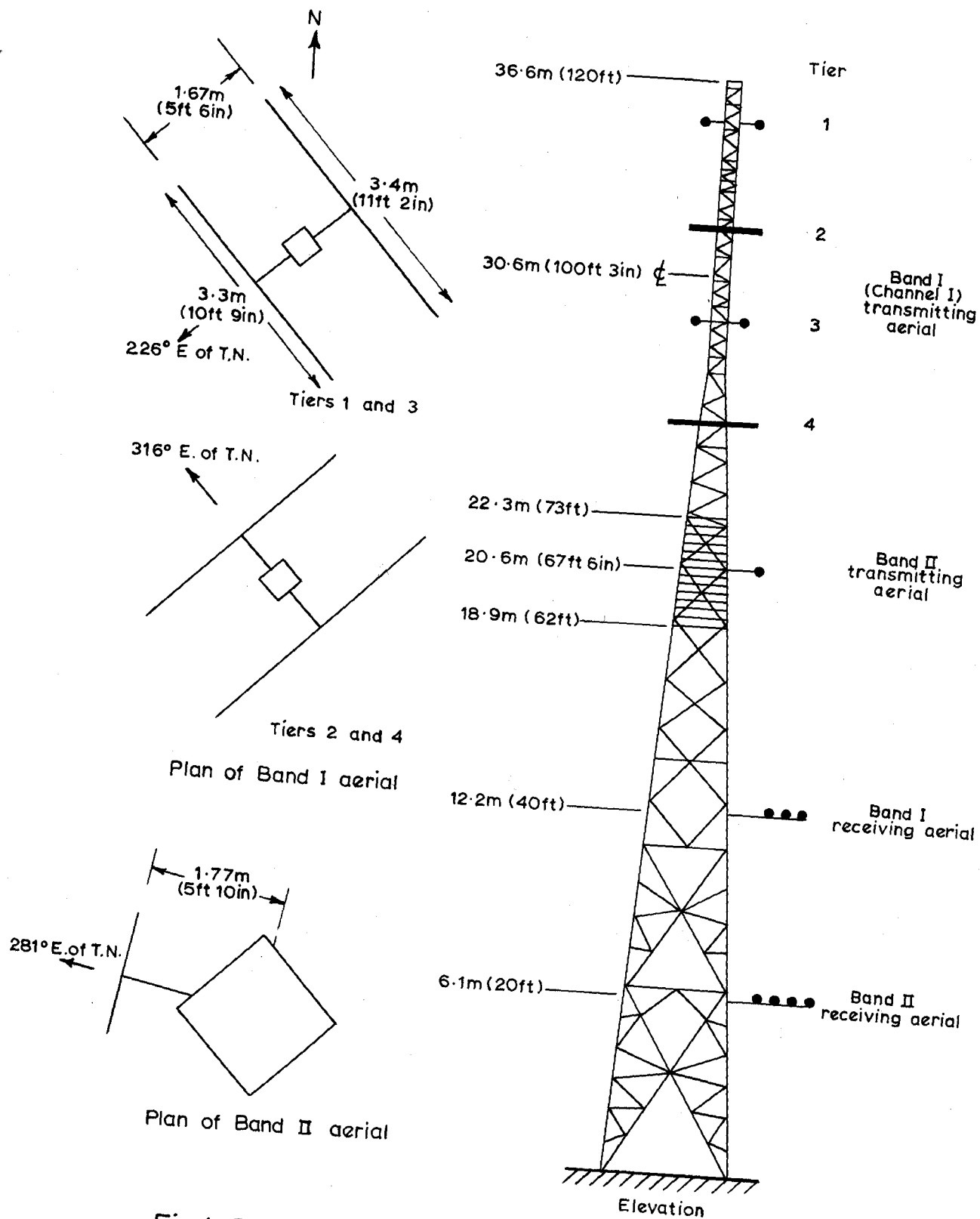


Fig.1. General arrangement of airtials on tower

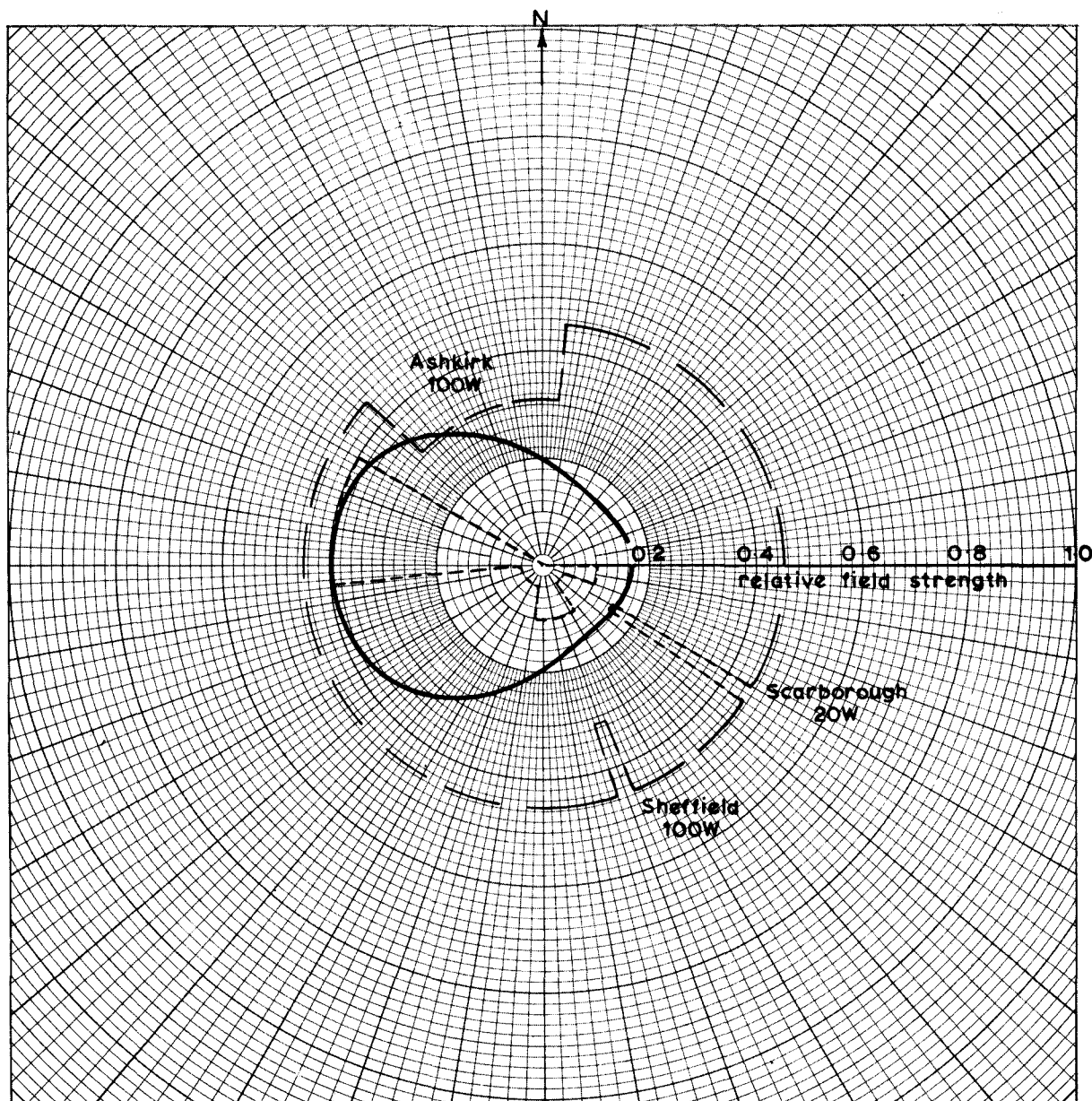


Fig.2. Templet and horizontal radiation pattern
HORIZONTAL POLARIZATION

Channel 1 (Vision carrier 45.0MHz, Sound carrier 41.5MHz)

Mean effective gain : -0.9dB

Transmitter power : 80W

Mean E.R.P. : 65W

————— Maximum permissible E.R.P.

----- Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 1kW

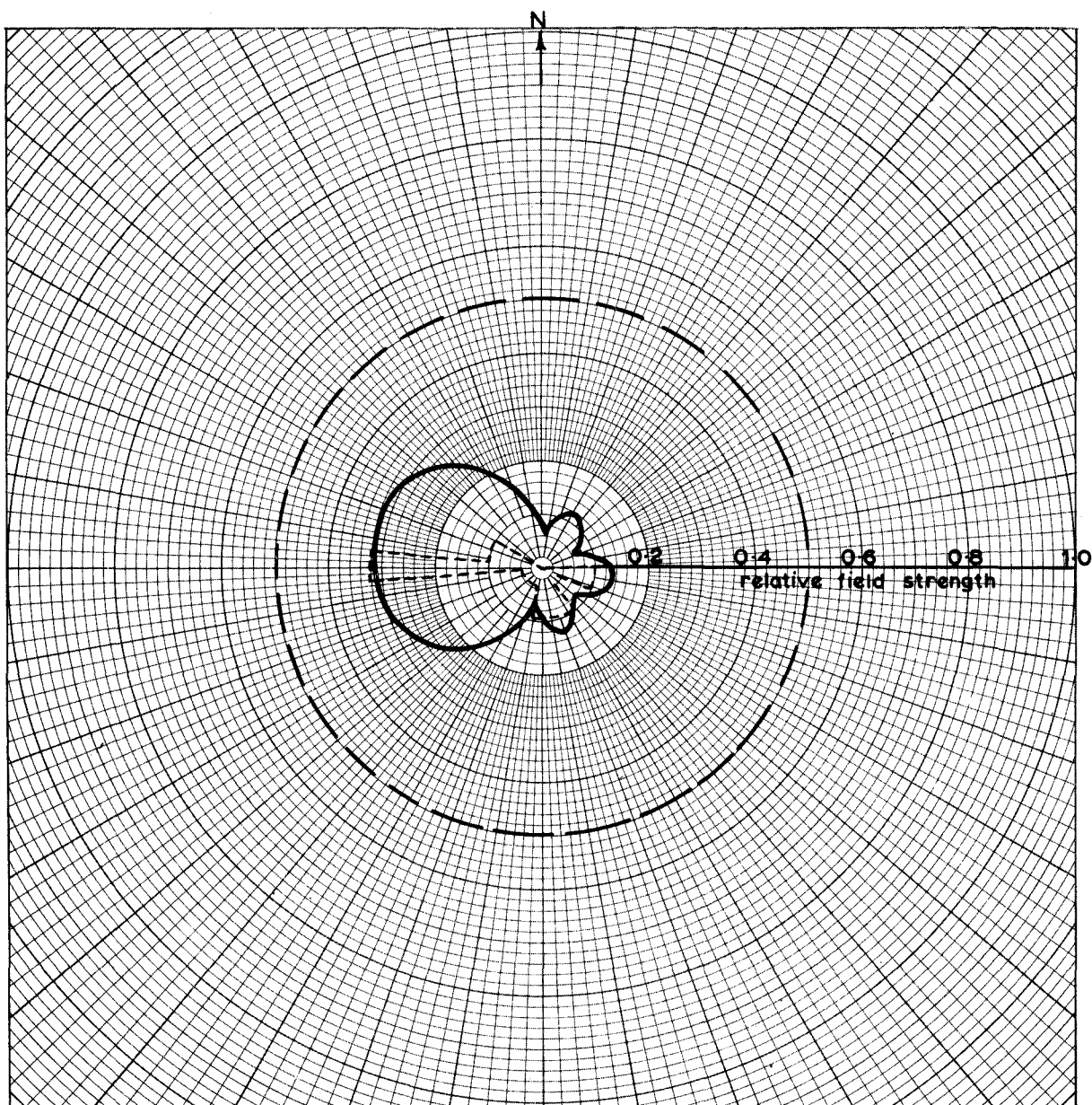


Fig.3. Templet and horizontal radiation pattern

HORIZONTAL POLARIZATION

89.7 (Light), 91.9 (Third), 94.1 (Home), MHz

Mean effective gain : -4.7dB

Transmitter power : 100W

Mean E.R.P. : 34W

—— ——— Maximum permissible E.R.P.

----- Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 1kW

